Indirect Adaptive Control of Micro Fluid Systems

Arash Edalatnoor[1]

[1]Department of Mechanical Engineering, Energy Systems and Power Electronics Lab, Purdue School of Engineering, IUPUI.

Digital microfluidics systems require advanced controllers to operate accurately because their parameters are subjected to change in environment and over time. Most of their fabricated system parameters are different from the destined values. Hence, estimation based controllers are required to identify the system parameters and control the droplet dispensing. This poster describes the application of an indirect adaptive trajectory controller for digital Pico-Droplet dispensing system. Forgetting factor recursive least square estimator is used to estimate the system parameters including capacitance and resistance of the occupying droplet between electrodes. This research presents indirect adaptive controller as a technique to measure and control the droplet volume on the dispensing electrodes. Simulations of the estimator, tracking performance of dispensed droplet volume and the controller's control effort are provided to demonstrate an accurate and high performance control approach.

Mentor: **Afshin Izadian**, Department of Engineering and Technology, Energy Systems and Power Electronics Lab, Purdue School of Engineering and Technology, IUPUI.